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Advanced Sensors

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Advanced Sensors Collaborative Technology Alliance



Consortium Partners

- BAE SYSTEMS
 - Northrop Grumman
 - DRS Infrared
 - Quantum Magnetics
 - General Dynamics
Robotic Sys
 - U. New Mexico
 - Clark-Atlanta
 - MIT
 - U. Maryland
 - Georgia Tech
 - U. Michigan
 - U. Florida
 - U. Mississippi
 - U. Illinois – Chicago
 - JPL

Objectives

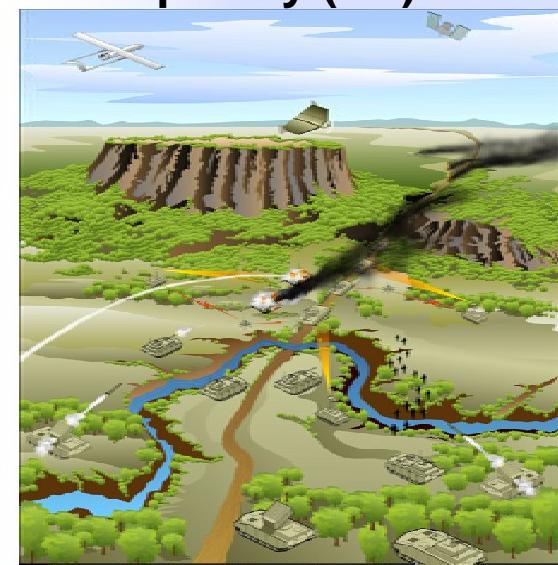
Technologies that increase sensor performance and utility, and techniques to combine many types of data to provide timely and meaningful information to the soldier.

Affordable sensors that provide:

- Continuous situation awareness
 - Rapid, precise detection and ID of camouflaged targets
 - Environmental sensing for navigation and self-defense

Technical Areas

- **Microsensors**
 - **Electro-Optic (EO) Smart Sensors**
 - **Advanced Radio-Frequency (RF)**





Advanced Sensors Collaborative Technology Alliance

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Microsensors

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BAE Systems: Mark Falco

EO Smart Sensors

ARL: Dr. Arnie Goldberg
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Advanced RF Concepts

ARL: Ed Viveiros
BAE Systems: Dr. Norm Byer

Multi-Target
Detection,
Classification,
& Tracking

High Operating
Temperature
Infrared Detectors

Devices and
Materials

Multi-sensor
Fusion

Innovative
Components for
Laser Radar

Electronically-
Scanned
Antennas

Autonomous
Sensor
Management

Hyperspectral
Imaging
Components

Systems Study

System
Performance &
Analysis

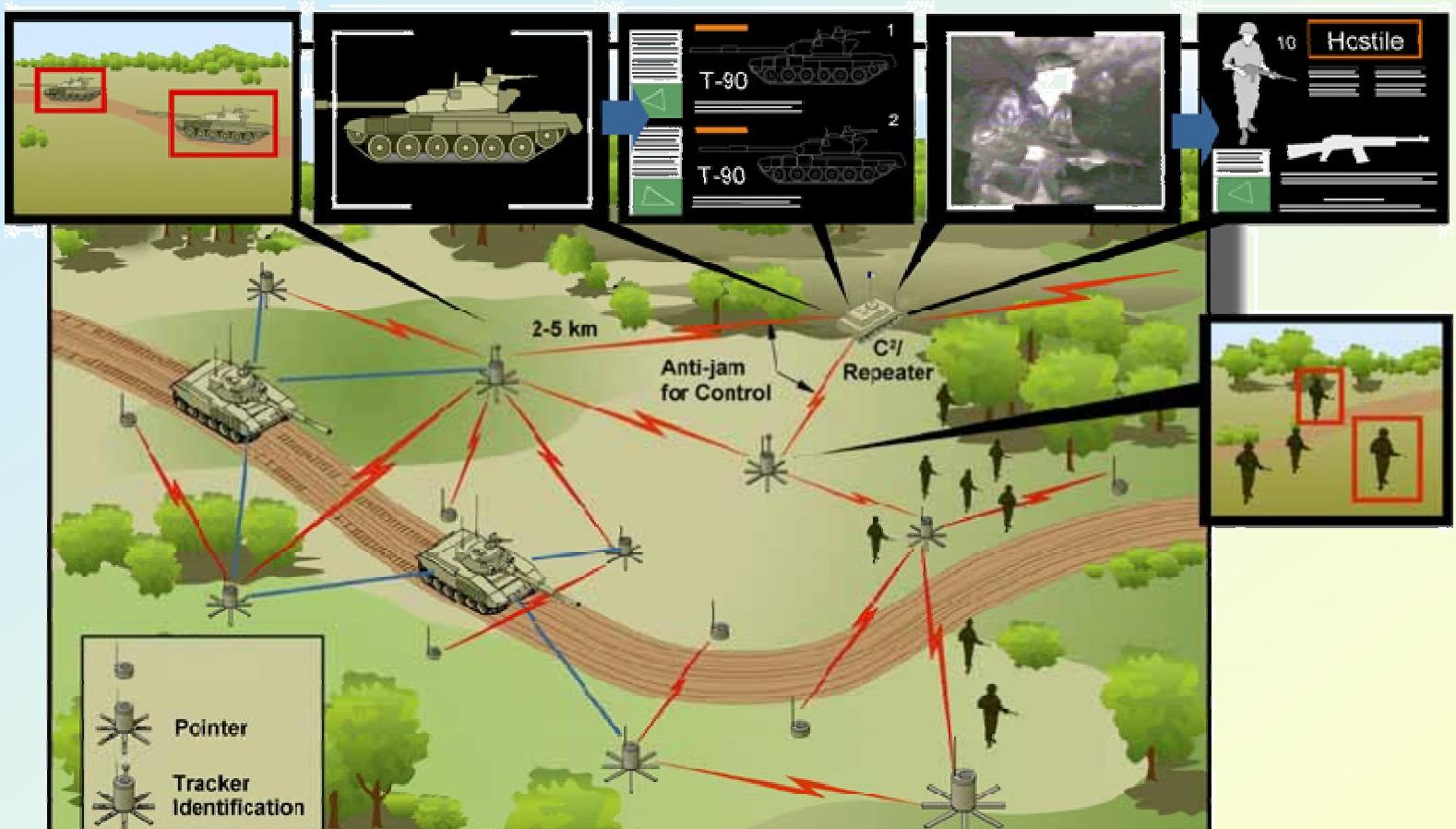
Automatic Target
Recognition and
Image Fusion



ARL

Microsensors

“The Vision”



- Self-localizing and calibrating sensor fields
- Very low power signal processing techniques to provide high throughput computation at nodes
- Fusion of data, features and decisions for robust performance and greatly reduced false alarm rates
- Hierarchical network with intelligent control to preserve power, reduce communication bandwidth and remove operator overload.
- Multi-sensor, multi-modal(imaging and non-imaging) low cost sensors for all weather performance
- Advanced algorithms for multi-target discrimination, tracking and identification of people and vehicles



Microsensors

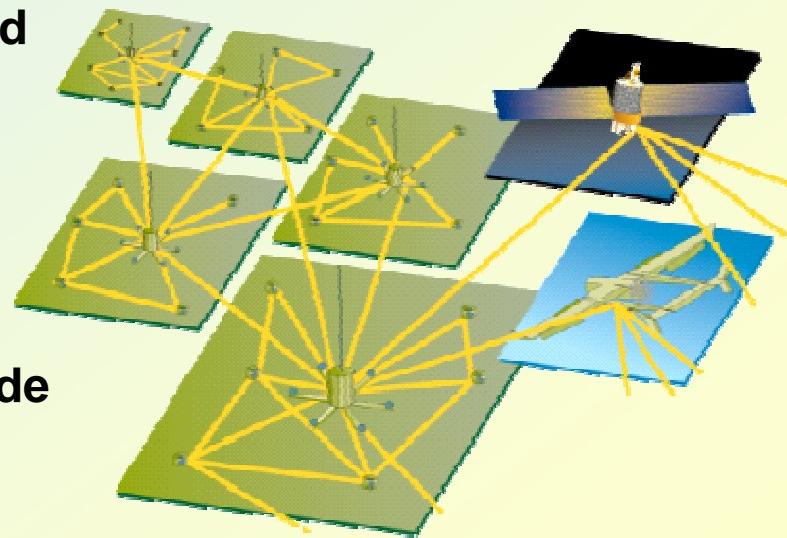
The Focus



Objective: Develop the theory, algorithms, and sensor improvements needed to realize an environment for the autonomous collection, processing, and control of information from networked heterogeneous microsensors to aid in the development of situational awareness and decision making for U.S Military and Homeland Defense applications.

Challenges:

- Robust multi-sensor fusion over constrained communications bandwidth networks
- Affordable detection, classification and tracking of multiple ground targets (people and vehicles) in high clutter environments
- Automated / aided sensor network configuration and management so that a wide area can be covered with minimum support from the warfighter
- Analysis of networked microsensors for the selection of sensor types and numbers, sensor improvements, architectures and low energy signal processing

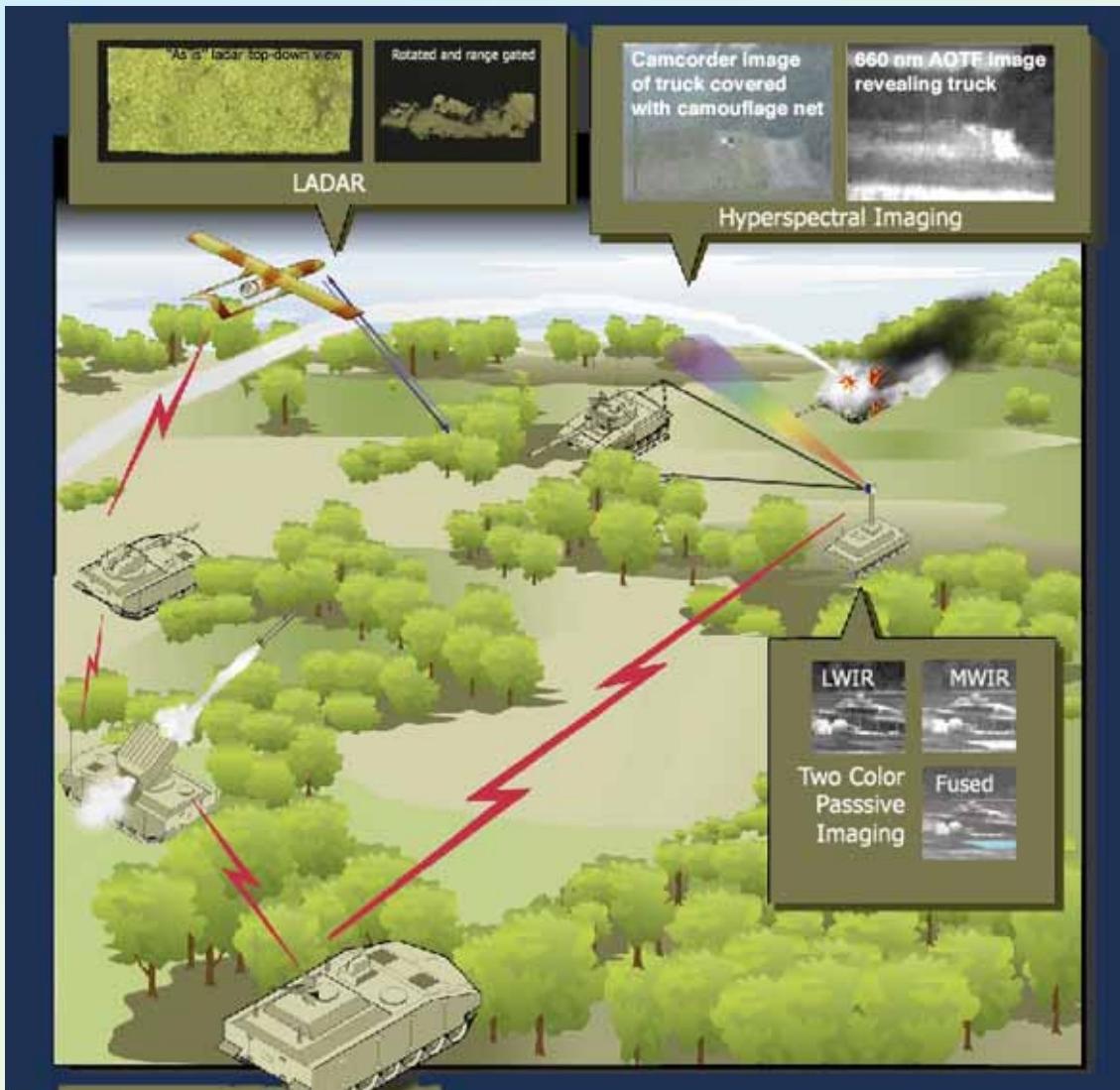




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EO Smart Sensors

“The Vision”





EO Smart Sensors

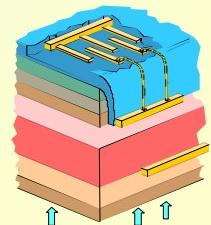
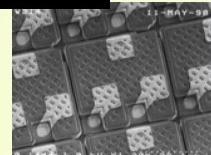
The Focus

Objective: Develop multifunction EO/IR components for next generation Army Systems, which will

- Allow exploitation of information in the full EO spectrum
- Allow rapid detection and identification of targets under all conditions

Challenges:

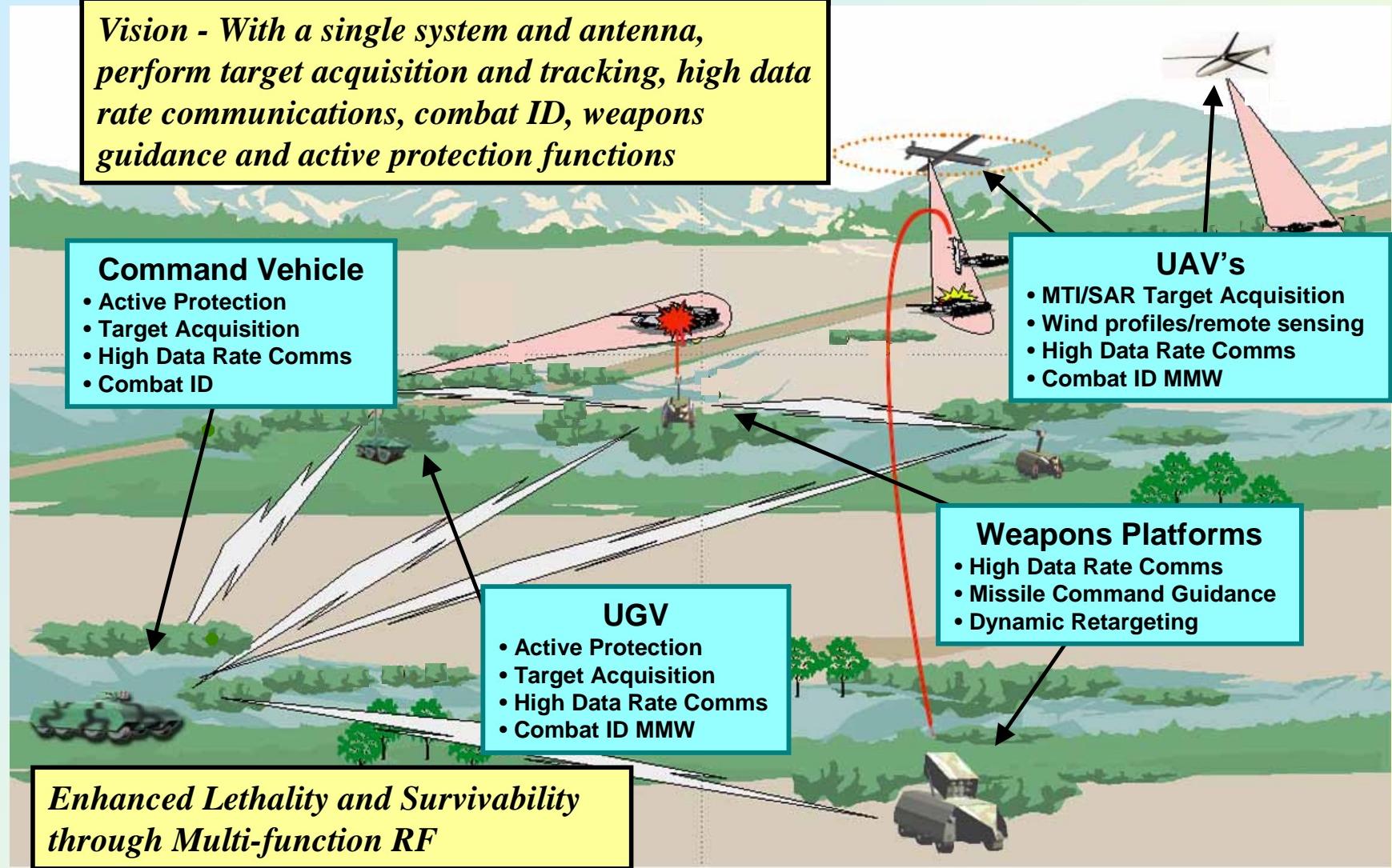
- High performance higher operating temperature infrared detectors to provide effective fire control in diverse battlefield conditions
- Active/passive imagers to afford highly integrated fire control in a compact form factor extending identification range and allowing the soldier to act first
- Hyperspectral imaging to afford target detection under low contrast and camouflage
- High speed optical interconnects for massive data transmission
- Multi-modal algorithms for remote surveillance & motion detection





Multifunction RF Systems

Vision - With a single system and antenna, perform target acquisition and tracking, high data rate communications, combat ID, weapons guidance and active protection functions





Advanced RF Concepts

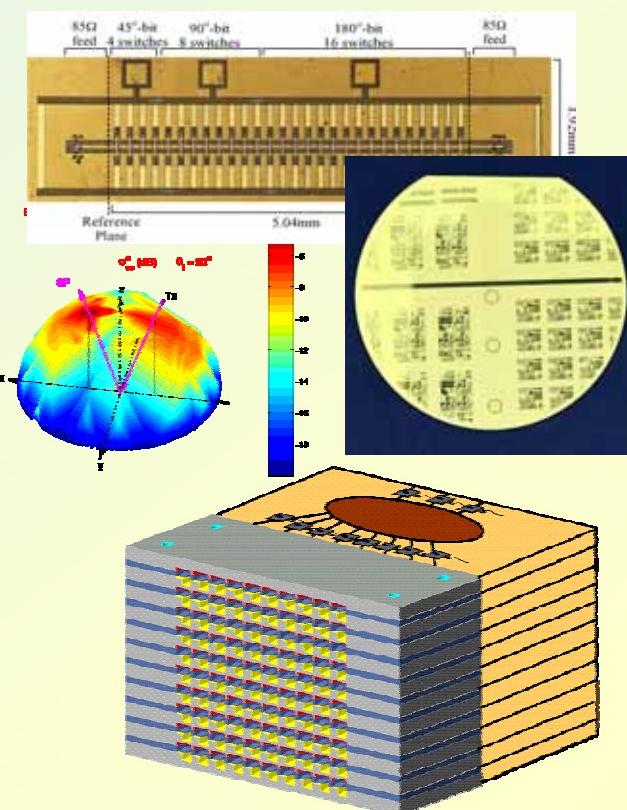
The Focus



Objective: Provide enabling subsystem, component and systems studies for low cost multifunction 27-40 GHz RF systems that provide Future Combat Systems with longer range all-weather operation for radar, communication, combat identification, and electronic warfare/signals intelligence functions.

Challenges:

- Affordable millimeter-wave Electronically Scanned Antennas (ESAs)
- Low-loss phase control elements
- Efficient, high dynamic range wide bandgap power devices for transmit/receive modules
- Propagation and scattering studies and phenomenological data for multistatic RF systems





The Advanced Sensors CTA is Developing the Critical Technologies to Enable the Future Force to See First, Shoot First, & Finish Decisively



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